

City Streets

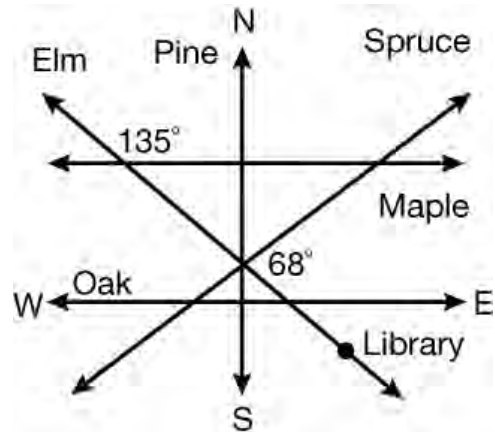
Although the locations of some city streets were determined by paths that herds of cows made, many city streets exhibit geometric patterns and involve intersecting lines and a variety of angles.

1. Maple Street runs east-west. Elm Street runs roughly northwest to southeast.

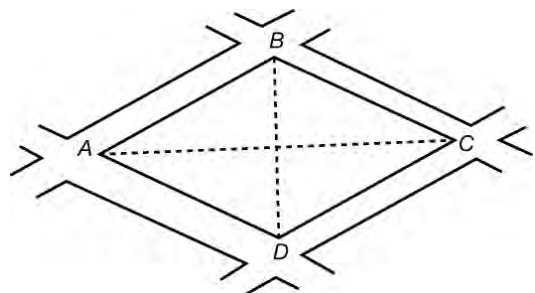
- a. Find the measure of the unlabeled angle north of Maple Street where Maple Street intersects Elm Street. Explain your reasoning.

- b. Find the measures of the other two angles in which Maple Street intersects Elm Street. Explain your answers.

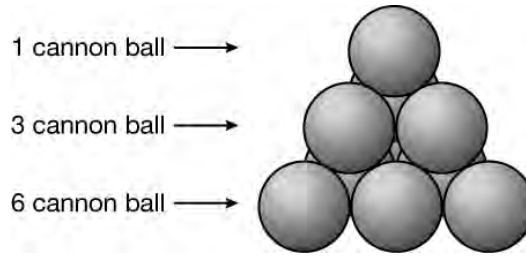
- c. The distance between the intersection of Elm Street and Maple Street and the intersection of Elm Street and Spruce Street is 393 ft. The distance between the intersection of Elm Street and Spruce Street and the library is 355 ft. What is the distance along Elm Street between the intersection of Elm Street and Maple Street to the library?



2. Four streets form the park shown. The formula for the area of the park, figure $ABCD$, is $A = 0.5(AC)(BD)$. The lengths in yards of \overline{AC} and \overline{BD} are $AC = 145$ and $BD = 72$, respectively. To the nearest hundred square yards, find the area of park $ABCD$. Show your work.



3. The town square near Liberty Street has many monuments. One monument consists of a stack of old cannon balls near an old cannon. There are six cannon balls in the bottom layer of the stack. Above that is a layer with 3 cannon balls. Above that is a layer with 1 cannon ball.



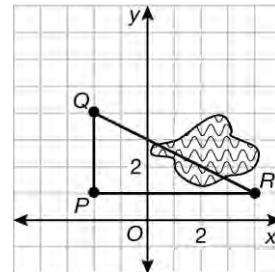
- a. Continuing the same pattern, complete the table for stack 4. How many balls would be in the bottom layer?

Number of balls	Stack 1	Stack 2	Stack 3	Stack 4
Bottom layer (1)	1	3	6	
Layer above (2)		1	3	
Layer above (3)			1	

- b. How many cannon balls would be on the bottom layer of stacks 5, 6, and 7? Explain.

- c. Freddie guessed that the number of cannon balls in the bottom layer of each stack from stack number $n = 1$ onward is $0.5n(n + 1)$. Verify that this is true for $n = 1, 2, 3, 4, 5, 6,$ and 7 .

4. On a gridded map of Triangle Town, a street runs from Q to R . There is another street passing through P and Q and a third street passing through P and R .



- a. Find the straight line distances between Q and P and between P and R . Explain your reasoning.

- b. To the nearest whole number, estimate the straight-line distance from Q to R .

5. An old street through B and G will be replaced by a new street containing B and D such that $\angle DBC$ and $\angle DBE$ are congruent and form a straight line. Why will \overline{DB} and \overline{CE} be perpendicular?

